MARICOPA COUNTY
Department of Transportation

Consultant CADD Deliverable Requirements

Prepared For:

Maricopa County Department of Transportation (MCDOT)

Engineering

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1 Requirement

Overview

It is the intent of the Maricopa County Department of Transportation (MCDOT) to maintain an up-to-date and accurate digital record of all relevant design and construction documents. The computer-aided drafting and design (CADD) database has been accorded a high priority, and MCDOT has developed standards for all CADD submittals.

It is imperative that consultants follow the CADD methodology prescribed herein. This standardization is to be followed precisely in the production of any type of CADD file for MCDOT.

CADD can produce large quantities of drawings, by many different individuals, in relatively little time. How reusable these CADD files are is often another matter. One of the basic tenets for the use of computer-based technologies is the practice of recycling previous work, thus saving time and taxpayers' funds on present and future projects. If a CADD file is not reusable, then its long-term benefit is needlessly lost. CADD files must be constructed in a predictable manner in order to maintain information that can be reused with minimum effort. The cost to regenerate existing data is too high a price to pay; the lost resources could have provided additional benefit to Maricopa County citizens. Standardization allows the greatest amount of reuse of information at the least cost to the taxpaying public.

1.1 Scope

These guidelines document typical MCDOT specifications to ensure efficient use of the CADD system. Their primary purpose is to serve as a guideline for defining consultant deliverables as they relate to CADD. These guidelines work in conjunction with the MCDOT Design Manual, which outlines MCDOT's current process for developing quality plan sets. It also works in conjunction with *Volume I - CADD Drafting Standards*, *Volume II - CADD Design Standards,* and *Volume III - CADD Production Standards,* which identify MCDOT specific CADD project conventions.

1.1.1 Background Information

The Engineering Consultant CADD Guidelines are formatted for publication and distribution as an independent document.

These guidelines detail specifications for required deliverables from consultants including surveyors, aerial photographers, and design consultants. Topics include:

- Determining type of survey, data needed, accuracy standards, and required scale.
- Forms of input data that are acceptable.
- Who is responsible for translating data.
- Acceptable software versions for data files.
- Acceptable format for both input and output data files.
- Media and/or method for data delivery.

These guidelines for various types of MCDOT projects have been determined in interviews with MCDOT design engineers and consultant project managers. They will not encompass every project scenario, but will serve as a guide for typical MCDOT projects.

1.2 Reference Documents

As previously mentioned, MCDOT follows standards defined in reference documents providing explicit instructions concerning the format of both electronic and hardcopy products. The guidelines defined in these documents are binding deliverable requirements for each engineering consultant's submittals. As such, each consultant is strongly encouraged to obtain the current versions of these resources prior to any contractual submittals. The following is a listing of these documents.

1.2.1 MCDOT Volume I - CADD Drafting Standards

This manual documents graphical standards such as the levels for all elements; the allowable annotation styles and sizes for given scales of plans; and the parsing of information into separate MicroStation reference files that are the basis of the digital database previously described. The volume also outlines how digital data is distributed among the 63 MicroStation levels, allowing manipulation and viewing based on real-world criteria. Those criteria fall into common groups such as pavement, utilities, signing, and structures.

1.2.2 MCDOT Volume II - CADD Design Standards

This manual details the methods for using the InRoads roadway design software in the MCDOT engineering process. Standards for horizontal and vertical alignments, methods for displaying information on construction plans, and the proper manipulation of Digital Terrain Models are established.

1.2.3 MCDOT Volume III - CADD Production Standards

This manual details the criteria involved in each phase of the design contract, as well as the various file formats associated with each activity. In addition, a workflow detailing step-by-step procedures required to create a CADD Deliverable or plan set submittal is included.

2 Consultant Guidelines

2.1 General

2.1.1 Software Used by MCDOT

- MicroStation "J" Version 07.00.00.67 (MicroStation "SE" Version 05.07.00.41)
  MicroStation, by Bentley Systems, is the base platform for MCDOT's drafting software. Its main function is to provide an environment for creating and viewing the graphics contained within CADD files, but it also provides the launching point for other related programs.

- InRoads Version 07.01.02.00 (Working with "SE": InRoads Version 07.01.01.00)
  InRoads, by Intergraph, is the civil design software package in use by MCDOT.

- Survey Select CADD Version 07.02.03.00
  Survey Select CADD is the software used by MCDOT for survey data collection and reduction.

2.1.2 Requirements for Submittal

Design work and aerial surveys performed for MCDOT are to be submitted in a MicroStation, InRoads, or Survey SelectCAD data format as appropriate.

- Design Submittals
  The project must be submitted in the accepted MCDOT directory structure outlined in *Volume I - CADD Drafting Standards*. All data files developed during the project are stored within the project directory. The ability to receive the entire project directory allows MCDOT to archive and use the submitted project with the same procedures employed internally by MCDOT.

  Design project submittals require the following files:

  - MicroStation 3D design files corresponding to the levels and names established in *Volume I - CADD Drafting Standards.*

  A set of InRoads binary files suitable for reproducing the project, including:

  - Alignment files, *.alg.
  - Digital terrain models, *.dtm.
  - Template libraries, *.tml.
  - Roadway libraries, *.rwl.
  - Preference files, Civil.prf and WYSIWYG.prf.
  - All files must be produced in the versions of MicroStation and InRoads in use by MCDOT when the contract is issued. The versions must be defined in the consultant's contract.

  A Design Submittal Checklist is included at the end of this document.

- Acceptable Media for Submittal

  MCDOT will accept projects delivered on 100 mb ZIP disks or CDROM, as determined by the Consultant Project Manager.

2.2 Design Consultants

2.2.1 Guidelines

The consultant is responsible for providing all submittals in the formats as detailed in Chapter 8 of *Volume III - CADD Production Standards.* The consultant is solely responsible for providing translations from any formats not specifically referenced in that document.

Projects will be submitted in MCDOT's project directory structure defined in Chapter 2 of *Volume I - CADD Drafting Standards*.

All submitted graphics files will be MicroStation 3D design files. The MCDOT "seed" files contain the correct coordinate system, global origin position, work units, and other Microstation settings as defined in *Chapter 5* of *Volume I - CADD Drafting Standards.* The elements in the files must meet the formats specified in *Volume I - CADD Drafting Standards.*

All InRoads and Survey Select CADD binary data files must meet the specifications detailed in *Volume II - CADD Design Standards*.

3 MCDOT Resources Available for Consultants

3.1 CADD Support Files

All CADD files submitted to MCDOT will be in the form of MicroStation design files (*.dgn), InRoads binary data files (e.g., *.dtm) and data reports in ASCII format for all activities referenced in *Volume III - CADD Production Standards*. Refer to the standards for specific products for each activity. All CADD output will be formatted as per the *Volume I - CADD Drafting Standards*, including leveling, file naming conventions, symbologies, project directory structures, etc.

To assist in the production of the required CADD files MCDOT has provided CADD support files on CDROM.

Consultants can obtain the CDROM from the Engineering CADD Support Staff (Fidencio Martinez 506-4150, George Rodek 506-8679) at MCDOT.

Consultants can obtain the MCDOT CADD Support files by downloading the files from the MCDOT Website (\\www.mcdot.maricopa.gov\fcg\default.htm).

4 Forms and Checklists

4.1 Form A: MCDOT Standards and CADD Support Files

Date:

- ❑ MCDOT *Volume I - CADD Drafting Standards*
- ❑ MCDOT *Volume II - CADD Design Standards*
- ❑ MCDOT *Volume III - CADD Production Standards*
- ❑ MCDOT Standard project directory structure
- ❑ MCDOT MicroStation seed files
- ❑ MCDOT MicroStation levels and settings group files
- ❑ MCDOT BarMenu MDL application
- ❑ MCDOT InRoads preference files
- ❑ MCDOT Survey SelectCAD feature table
- ❑ MCDOT Survey control codes

4.2 Form B: MCDOT Design Submittals Form

Check files included in this submittal

Project directory:

- ❑ Standard MCDOT project directory structure as defined in *Volume I - CADD Drafting Standards.*

MicroStation 3D files:
All elements in assigned levels as detailed in Volume I - CADD Drafting Standards

- ❑ Existing Topography- **WO#XTOPO.ref**
- ❑ Existing Utilities- **WO#XUTIL.ref**
- ❑ Existing ROW- **WO#XROW.ref**
- ❑ Existing Survey- **WO#XSURV.ref**
- ❑ Roadway Design- **WO#DESIGN.ref**
- ❑ Profiles- **WO#PROFILE.ref**
- ❑ Grading- **WO#GRADE.ref**
- ❑ Cross Sections- **WO#CSEC.ref**
- ❑ ROW- **WO#ROW.ref**
- ❑ Utilities- **WO#UTIL.ref**
- ❑ Drainage- **WO#DRAIN.ref**
- ❑ Structures- **WO#STRUCT.ref**
- ❑ Signing- **WO#SIGN.ref**
- ❑ Landscape- **WO#LSCAPE.ref**
- ❑ All MicroStation sheet files

InRoads binary files:
All binary files as detailed in Volume II - CADD Design Standards

- ❑ InRoads project files- *.rwk
- ❑ InRoads alignment files- *.alg
- ❑ InRoads Digital Terrain Models- *.dtm
- ❑ InRoads template library- *.tml
- ❑ InRoads roadway library- *.rwl
- ❑ InRoads civil preference files- *.prf
- ❑ InRoads WYSIWYG preference files- *.prf

ASCII Report files:

- ❑ Alignment reports